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C TRIPLE PRIME: WORK STATEMENT

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WORK STATEMENT
DEVELOPMENT OF A SATELLITE RECONNAISSANCE
AND RECOVERY SYSTEM
C TRIPLE PRIME PROGRAM

I. SCOPE

This document defines the work required of LMSD, hereinafter referred to as the contractor, for the program coordination, interfaces, system integration, system logistics and facilities, as well as the design, development, test, and manufacture of the system flight assembly, system cable harnessing, equipment installation, and all system tests of the reconnaissance system hereinafter known as the C Triple Prime Program, consisting of a camera subsystem, re-entry capsule subsystem, fairing subsystem, ground support equipment (GSE), and ancillary equipment. The flight program shall consist of six operational systems.

A. Each camera subsystem - shall consist of one C''' type camera and one cassette. This equipment shall be provided by the Itek Laboratories (division of Itek Corporation), as subcontractor to LMSD in the quantities listed herein in section IX.

B. Each Re-entry Capsule Subsystem - shall consist of the Mk 4 subsystem. The Mk 4 SRV subsystems and associated spares shall be provided by General Electric, (subcontractor to LMSD).

C. Each Fairing Subsystem - shall consist of one fairing section, system intercabling and ancillary equipment as required to provide proper support, physical integration, and orientation of the camera. Requisite interfaces between the camera and REC as well as between the C Triple Prime reconnaissance system and the Agena Satellite shall be provided by the fairing subsystem.

D. Ground Support Equipment. Ground handling, test, and checkout equipment will be provided.

E. The photo-reconnaissance system shall have the following design objectives:

1. A satellite-borne system compatible with the Agena-Thor Vehicle System.
2. System locational accuracy to be within one mile.
3. Maximum ground coverage consistent with resolution requirements and vehicle performance.
4. Photographs shall be obtained at a ground resolution of 20 ft. or better based upon a design altitude of 150 miles and use of high resolution film types SO-130 or SO-132.
5. Latent image film shall be recovered by means of ballistic re-entry and air or sea recovery.

II. PROGRAM MANAGEMENT

The Lockheed Aircraft Corporation Missiles and Space Division shall plan and conduct program development, design, test, and manufacturing leading toward the attainment of the C Triple Prime Reconnaissance System described under Scope.

Overall technical direction of the program is the joint responsibility of several agencies of the Government. In the interest of effective management, however, such direction will be provided primarily by and through the Air Force, Space Systems Division, acting as the agent for all interested components of the Government. A project officer established in SSD will be the single day-by-day point of contact for the Contractor. LMSD shall establish and maintain technical and management control of subcontractors as are required for proper execution of the work statement. Major subcontractors are Itek Laboratories and General Electric Missile and Space Vehicle Department.

Subject to the overall management of SSD [redacted]/Headquarters, LMSD shall fulfill responsible systems management of the C Triple Prime Program as Weapon System Contractor. Government approval of the technical decisions of the Contractor shall not be required prior to implementation, except as specifically set forth elsewhere in this contract. This provision should not, however, be construed in any way limiting the right of the Government to direct or re-direct the technical aspects of the Contractor's efforts at any time. Where such direction affects costs or schedule, or is contradictory to the provisions of this work statement, normal contract

change procedures will apply.

This work statement covers the period from the inception of the program through 31 December 1961. Attainment of program milestones will be reported monthly.

The Contractor's drawings pertaining to items of airborne and ground support equipment shall be assigned Contractor design activity drawing numbers and shall be prepared in accordance with established practices. Included will be drawing lists and associated specifications and procedures. Subcontractor's drawings and specifications shall be incorporated in and become a part of the System "directed flow" drawing list.

The management activities shall be defined as the centralized direction of the program by the Contractor, including management activities in the specific areas of planning, development, test and operations, program administration, reliability, and security.

Special security measures will be required throughout the program. The complete security plan, clearance of facilities and of individuals knowledgeable of the program, and other matters relating to security will be under the direction of a designated authority within the Government. The contractor will provide such special security measures within his own facilities, subcontractors' facilities, or Government facilities provided for this project, as may be required to conform with the security plan.

Analysis, Studies and Co-ordination. The contractor shall perform engineering, operational and post-flight analyses, system design studies, modification

design, and engineering liaison, production co-ordination and data release, technical support for the system integration of all subsystems being developed under this contract, production engineering, materials processes, components and standards services, and shall perform all other tasks required to insure efficient development of the C Triple Prime Recommaissance System. The scope of such activity shall be sufficient to co-ordinate the work further described under each subsystem, to reach the program milestones, and to maintain a continuing review of the adequacy of the detailed requirements of this contract performance.

Applicable Documents:

LMSD Design Control Specification, AET 6001. General Environmental Specification, LMSD 6117B, dated 1 July 1960.

Following paragraphs shall not apply: - para. 1.2.4.1, para. 3.2.1.4, para. 3.2.1.5, para. 3.2.1.9, para. 4.3.1, para 4.4, para 4.6, para 4.7, para. 4.8. Paragraph 1.1.5 will be changed to substituted "Advanced Projects Engineering Department of the Contractor" for "Spacecraft Structures Department of the Contractor." Paragraph 1.2.2.1 shall be deleted and the following substituted:

"Equipment shall be transported by motor vans and/or military transport aircraft. The equipment shall be protected and packaged to withstand such conditions as well as shock and vibration prevalent during shipping."

Paragraph 1.2.3 shall be deleted and the following substituted:

"Contractor storage facilities will not ordinarily be air conditioned. Although heat and high humidity variations may occur, the equipment should be able to withstand such conditions."

Engineering Specification, Electrical Wiring SP-660, dated 8 December 1960

Reports Requirements Exhibit, LMSD 445652, dated 18 September 1959

Applicable sections are as follows: Sections 2, 3, 6, 7, 8, 12, 14, 16, 17 and 18 (to be following in accordance with format established).

NAVEXOS P1851, Line of Balance Technology, dated 24 February 1958

III DEVELOPMENT

A. Fairing Assembly

A fairing assembly shall be designed and developed. The fairing will contain structural support for one C''' camera assembly, and will attach to the Agena vehicle. Openings will be provided for the panoramic camera, and the two horizon cameras. These openings will be closed by doors which will be jettisoned when satellite reaches orbital altitude. The forward surface of the fairing shall provide for attachment of the Mark 4 Recovery Subsystem.

The fairing assembly will also contain the electrical cabling required to interconnect all the electrical subassemblies comprising the C Triple Prime Reconnaissance System and the Agena vehicle.

Light seals and thermal shields will be designed as required to insure protection of the film from light and heat. The fairing assembly will include instrumentation to monitor relative humidity, and an installation to provide for purging the assembly with dry nitrogen. Provision will be made for the control of the temperature of the payload system by passive means. This will be accomplished by controlling the absorbtivity-emissivity ratios for all radiating surfaces.

B. Camera

The cameras will be developed by Itek Laboratories. LMSD will provide engineering liaison to insure compatibility of interfaces between the cameras and other components of the payload system.

LMSD will cooperate with Itek in their design efforts to insure that the mechanical, electrical, and control characteristics of the cameras are compatible with payload system and Agena satellite system requirements.

C. Recovery System

1. General

The recovery subsystem development effort shall be that effort required to design, develop, and produce the MK 4 SRV vehicle. LMSD will provide engineering liaison to insure compatibility of interfaces between the fairing and the camera subsystem. LMSD will cooperate with General Electric in their design and production efforts to insure that the mechanical, electrical, and control characteristics are compatible with camera, cassette, and fairing requirements.

2. T/M System

The Blossom T/M system to be flown in the C Triple Prime system will be of the same type as used in a previous program. LMSD will review the T/M System and make sensor modifications as deemed feasible to increase quantity and quality of information obtainable from the C Triple Prime recovery system T/M.

D. Ground Support Equipment

1. Ground Handling Equipment: Ground handling equipment will consist of, but not be limited to the following:

(a) Fairing dolly

(b) Shipping dolly

(c) Pad mating dolly

(d) Vertical mating dolly

(e) Universal hoisting fixture

(f) Universal hoisting sling

(g) Miscellaneous slings and fixtures

(h) A security cover

(i) A temperature control blanket

2. Checkout Equipment: Electrical test and checkout equipment will consist of, but not be limited to, the following:

(a) System Test Console and Intercabling

(b) HATS Console and Intercabling

(c) Vehicle Simulator

(d) Payload Simulator

(e) Miscellaneous Laboratory Test Aids and Cables

Existing test and checkout equipment will be converted for use in the C Triple Prime Program, when such conversion does not conflict with the requirements of other programs. (See Hardware, IV, A, 6)

SPECIAL HANDLING

IV. HARDWARE

A. Manufacturing Services

The Contractor shall use the established method (as exercised on previous programs) in the planning, routing, and dispatching of manufacturing work from Engineering releases to the support of hardware fabrication and assembly, and/or installation of Subcontractor furnished equipment. The manufacturing services will be concerned with the following:

1. The fairing assembly and all prescribed associated parts.
2. Installation of the camera assembly and all related parts.
3. Checkout and installation of the recovery assembly and all related parts.
4. The cold gas spin/despin system.
5. The Blossom T/M system.
6. Fabrication of ground support equipment for testing of assemblies, sub-systems, and the complete integrated system. Some of this equipment is existing and with minor modifications will be made available for this program. (See Development, Sec. III-E.)
7. Any other components required for the system not otherwise provided for.

B. Special Tooling

Special jigs and fixtures required to produce, align, and/or install the specified hardware shall be designed, developed, and fabricated.

SPECIAL HANDLING

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C. Functional Test Equipment

1. Equipment will be required to functionally test each component, sub-assembly and assembly to insure proper operation as specified. This test equipment entails the following functional categories:

   (a) Electrical and electronic

   (b) Mechanical, including pressure and electro explosives

   (c) Optical

2. In view of substantial investments in this type of equipment, every effort will be made to use test equipment, either directly or by modification, previously developed and utilized by prior programs. A typical list of test equipment required follows:

   (a) Test consoles

   (b) Control consoles

   (c) Collimators

   (d) Alignment tools

   (e) Recorders

   (f) Vehicle power simulators

D. Mockups and Models

There shall be three (3) separate and distinct mockups prepared for the sub-systems for engineering evaluation of space, weight and c.g., and thermal design. These mockups shall be used throughout the design, development, and production phases of the program.

E. Fabrication and Assembly

All units shall be fabricated, assembled, and delivered in accordance

with the contract schedule.

The integration of the sub-systems into the complete system is the responsibility of LMSD.

The facilities required to insure proper fabrication and assembly of the fairing sub-system and the integration of all sub-systems will be made available. The details covering the facilities are included in this Work Statement in Section VIII.

F. Inspection

1. All sub-systems shipped to LMSD by Sub-Contractors, as well as components, parts, and other spares, will be subjected to a thorough receiving inspection and functional test upon receipt. The established methods of receiving and inspecting hardware will serve as a basis for establishing the new procedures which will be required. A buy-off book will be established for each system for the recording of all useful data from receiving inspection to the buy-off of the system.
2. Inspection shall participate in all applicable LMSD Test Programs to insure compliance with the test specifications.
3. Reporting: The results of inspection and testing shall be reported at specified intervals. These reports shall be official documentation of the fact that each sub-system and the integrated system complied with the performance requirements of the program specification.

V TESTS

A. Reliability Testing

LMSD shall manage the overall planning, development, and execution of a reliability program which will indicate satisfactory reliability of subsystems, subassemblies, components, and parts (as differentiated from development, qualification, and acceptance testing) for the C Triple Prime Program. LMSD will conduct such portions of the reliability program as applicable to the fairing assembly, the modifications to the recovery subsystem, and the interfaces between major subsystems as necessary. The conduct of these tests shall include the preparation of reliability test specifications, procedures, and reporting of test results to insure reliable flight performance.

B. Development Testing

LMSD shall conduct development and/or engineering testing as required to establish, or prove out, design feasibility as differentiated from reliability, qualification and acceptance testing. This effort will include the cost of the test effort and test reporting as well as the cost of those components, assemblies, subassemblies, or parts required in the execution of these tests.

Specific Tests to be executed by LMSD shall include but not be limited to the following:

1. Fairing structural tests.
2. REC water stability tests.

C. Qualification Testing

LMSD shall manage and execute a qualification test program to

accumulate test results which will verify that the complete payload system (fairing, camera, and recovery subsystems) meets the design specifications. This effort will take advantage of qualification of designs and of components previously accomplished on similar programs.

This effort will include the preparation of qualification test specifications and procedures, as applicable, to indicate satisfactory performance under flight simulated environments of the C Triple Prime Program.

Specific tests to be executed by LMSD or designated subcontractor shall include but not be limited to the following:

1. Payload System Vibration
2. Payload System High Altitude Temperature Simulation
3. Payload System Acceleration
4. REC Water Stability
5. Camera Subsystem Vibration and Shock
6. Camera Subsystem Acceleration
7. Camera Subsystem Vacuum Test

D. Acceptance Testing

The Contractor shall manage and execute acceptance testing on each payload system to verify that the system meets design requirements and has no defects which would prevent its normal functioning in flight environment. It is understood that qualification and approval of the design must be completed prior to flight of any system. This effort includes the prepartion of acceptance test specifications and

procedures, as applicable, to indicate flight readiness for the C Triple Prime.

Specific Tests to be executed by LMSD shall include but not be limited to the following:

1. Subsystem checkout of fairing and REC subsystems.
2. Supervision of and participation in the camera subsystem checkout.
3. Perform clock checkout.
4. Performance of and participation in System Vibration Test.
5. Performance of and participation in High Altitude Temperature Simulation.
6. Performance of and participation in Pre-shipment checkout.
7. Performance of and participation in Final Pre-Flight checkout.

The above acceptance testing will be planned and executed with the specific interest that any and all incipient failures are discovered prior to flight and that the useful life of the equipment is not reduced below mission requirements.

All acceptance tests will be run on each complete system to verify workmanship and operation. The individual tests shall be run with no adjustments or repairs during the course of the test. If any modifications or repairs are made following the completion of any acceptance test, all tests previously run on the system must be re-run, unless an explicit waiver is granted, based on the demonstration or technical explanation that the modification or repair will not affect the response to the particular test or tests.

E. Special Test Equipment

LMSD shall design, develop, fabricate and/or procure any special equipment and/or fixtures designed and constructed specifically to conduct tests associated with the reliability, development, qualification, and acceptance testing. This item shall include any and all equipments of unique design, fabrication and/or performance which are not generally available in the required quantities in the facilities used for the C Triple Prime Program.

SPECIAL HANDLING

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VI. CONTRACTOR FURNISHED FACILITIES

A. General

The requirements for Contractor-furnished facilities and equipment for the C''' program are established in this section. Facilities will be provided to support program administration and direction; design and development; system and flight testing, control and telemetry.

B. Requirements

1. LMSD Inplant Facilities. Lockheed inplant facilities utilized in the C''' program will be located in the Palo Alto -Lockheed area. This facility will support the design, fabrication, development, laboratory testing, assembly, installation, production, and program management activities necessary to accomplish the objectives of the C''' program. Environmental tests requiring vibration, shock, acceleration, altitude/thermal equipment will be conducted at the LMSD Sunnyvale environmental test facilities.

2. The Contractor shall provide a level of Security commensurate with the DOD minimum requirements. Any special security requirements imposed upon the Contractor by the Customer shall be the subject of separate negotiations.

VII. GOVERNMENT FURNISHED EQUIPMENT, FACILITIES, AND SERVICES

The government shall furnish equipment, facilities, and services at such locations and times appropriate to maintain scheduled conduct of the program.

A. The following government furnished facilities shall be required:

1. Vandenberg Missile Assembly Area
2. Vandenberg L Building
3. Vandenberg Launch Pads 1, 4, and 5
4. Hawaiian Control Center
5. Engineering and office space, plus necessary office furnishings and equipment at all sites
6. Blockhouse space at Vandenberg AFB for checkout and firing consoles and special instrumentation as required
7. Outdoor storage area at all sites if required
8. Hazard storage area at all sites
9. Shop and laboratory space, plus necessary machine and portable tools, laboratory and testing equipment, material handling equipment, and necessary installation costs at Vandenberg AFB

B. The following government furnished services shall be required at the government facilities listed above:

1. Equipment transportation to and from sites
2. Ships, boats, aircraft, and related equipment required in support of recovery operations on re-entry capsules

3. Use of military base services, when available, and in accordance with DOD policy such as mess, guard services, transportation, recreation facilities, utilities, fire protection, first aid, and major maintenance service of buildings, grounds, and utilities.

C. The following government furnished equipment shall be required in accordance with schedule:

1. Thor boosters, associated receipt checkout and launch facilities, equipment and services.
2. Agena B Vehicles, associated receipt checkout and launch facilities, equipment and services.
3. Film of type and quantity sufficient to fill all needs for testing, checkout and flight operations. All film to be furnished on "as required" basis. Film shipping containers shall also be furnished.

VIII. LOGISTICS

A. Responsibility

The LMSD Logistics organization, in coordination with the [redacted] sub contractors, shall be responsible for the provisioning functions to support flights, test, and checkout operations for the following assemblies:

1. Fairing Sub-system Assembly
2. Camera Sub-system Assembly
3. Recovery Sub-system Assembly

B. Implementation

The above noted responsibilities will be accomplished in the following manner:

1. Establish and maintain spares lists for all flight, test and checkout equipment to support flight operations.
2. Maintain continuing liaison with Sub contractors, vendors and all suppliers to insure the timely delivery of hardware.
3. Maintain stockrooms and inventories to support operations.
4. Operate shipping and receiving functions as required.
5. Operate transportation and traffic control functions on a timely and continuing basis.
6. Perform disposal functions relating to obsolescent material.
7. Establish hardware recycling plan where rework and/or repair is involved.
8. Monitor follow-up in all of the above functions and maintain status records of hardware at all times.

IX. SUBCONTRACTOR FURNISHED EQUIPMENT

A. Itek Laboratories shall provide the following:

1. Two each qualification models of the C Triple Prime camera. One will be deliverable to LMSD on or before 1 January 1961. One will be retained by Itek Laboratories for the qualification testing program.
2. Six each operational models of the C Triple Prime camera with delivery of first commencing on 1 April 1961 and balance to be delivered at rate of one every two weeks until completion.
3. Nine each cassettes with delivery of first on 1 April 1961 and balance to be delivered at rate of one every week until completion.
4. Two sets of alignment jigs for aligning camera and cassette. Delivery will be 1 January 1961.
5. Six each camera handling dollies.

B. General Electric shall provide six each Mk 4A SRV recovery subsystems with delivery to begin 18 March 1961 and balance to be delivered at rate of one every two weeks until completion.